α – network
Analysing
Longitudinal
Population-based
HIV/AIDS data on
Africa

Special meeting on sexual behaviour measurement

Mwanza, 7th - 9th December 2009

Report

Abbreviations

ACASI	Audio Computer Assisted Survey Interview
AIS	AIDS Indicator Surveys
ALPHA	Analysing Longitudinal Population-based HIV/AIDS data on Africa
APHRC	African Population and Health Research Centre (Nairobi, Kenya)
ART	Anti-retroviral Therapy
ASPAR	Age Specific Partner Acquisition Rtae
CDC	Centre for Disease Control (US)
CPS	Centre for Population Studies (LSHTM)
CTC	Care and Treatment Centre
DHS	Demographic and Health Surveys
DoB	Date of Birth
DSS	Demographic Surveillance System
ERB	Ethical Review Board
FTFI	Face to Face Interview
GoT	Government of Tanzania
ICVI	Informal Confidential Voting Interview
IDU	Intravenous Drug Users
IVR	Inter-active Voice Response
LSHTM	London School of Hygiene and Tropical Medicine
MITU	Mwanza Intervention Trials Unit
MARP	Most at Risk Populations
MERG	Monitoring and Evaluation Reference Group (UNAIDS)
MoHSW	Ministry of Health and Social Welfare (Tanzania)
MRC	Medical Research Council (UK)
MSM	Men who have Sex with Men
NACP	National AIDS Control Programme (Tanzania)
NIMR	National Institute for Medical Research (Tanzania)
PDA	Personal Digital Assistant
RDS	Respondent Driven Sampling
SDB	Social Desirability Bias
SMS	Short Message Service
SSA	Sub Saharan Africa
STI	Sexually Transmitted Infection
TAZAMA	(Swahili for “search”) HIV cohort study located in Kisesa ward, Mwanza
UNAIDS	the joint United Nations Programme on HIV / AIDS
USSD	Unstructured Supplementary Service Data
UVRI	Uganda Virus Research Institute
VCT	Voluntary Counselling and Testing
WHO	World Health Organisation

Introduction

This report concerns a special meeting of the ALPHA network, hosted by the TAZAMA study at the MITU conference facility in NIMR, Mwanza, Tanzania, December 7th-9th 2009. The meeting was funded by UNAIDS through a grant (PO 200126537) to CPS in LSHTM (ref EPCPVP42).

The ALPHA network

This network of African community-based HIV cohort studies, funded by the Wellcome Trust, has been in existence since 2005, bringing together 6 study sites (from Uganda, Tanzania, Malawi, Zimbabwe and South Africa – see appendix for details). It will expand in 2010 to include another 4 study sites (from Kenya, Tanzania and South Africa). The network helps member sites with analyses of demographic and epidemiological aspects of their longitudinal data. Workshops are organised and hosted by member studies to prepare data in a common format and to teach local scientist the appropriate analytical techniques. If possible, data are pooled to enable inter-site comparisons and to strengthen analytical conclusions. Results are published in special themed journal issues, which combine site specific papers and meta-analyses. The topics covered to date include HIV incidence, impact of HIV on family demography, survival post infection, trends in sexual debut and first marriage, and uptake of VCT and ART; future planned analyses include HIV and fertility, impact of HIV on child mobility, paediatric HIV, impact of ART on HIV incidence, and sexual partnership dynamics. Analytical results obtained in ALPHA network studies have been used by UNAIDS in building epidemiological models used to predict epidemic trends.

Aims of this meeting

UNAIDS has expressed a particular interest in a definitive analysis of the role of concurrent sexual partnerships in determining the spread of HIV, and approached the ALPHA network about the feasibility of undertaking such work. This topic is already on the agenda for future joint research by the network partners, but experience in the first phase of ALPHA studies has shown that there is a wide divergence between sites in sexual behaviour data collection, both in terms of content and instruments used. At the same time there is a need to validate, in a longitudinal setting, the standard tools for collecting information on sexual behaviour currently being developed for use in cross-sectional surveys such as DHS and AIS. UNAIDS therefore agreed to fund this special meeting of the ALPHA network so that those responsible for developing data collection tools could get together and discuss how best to collect sexual behaviour data in the future in order to ensure enough commonality between sites to enable comparative and meta analyses to be undertaken, and to validate the approaches currently used in cross-sectional approaches. By developing a common approach now, it is hoped that most ALPHA sites will be able to use a shared core set of behaviour questions in at least two survey rounds before the planned workshop on sexual partnership dynamics in 2015.

Sessions: presentations & discussions

The original meeting agenda is shown in the appendix. Because of some last minute travel cancellations two papers were withdrawn, and timing of the discussions was changed as a result, so that a whole session was dedicated to discussing the implications of the presentations for the future work of the ALPHA network. However, in presenting this report, discussion points referring to individual sessions and presentations have been included at the end of the relevant session.

Summary of presentations

Presentations covered three broad themes: Day 1 was about the experiences of ALPHA sites and other studies with data collection methods and questionnaire styles; Day 2 focussed on proposed analysis methods for understanding concurrency and other risky sexual behaviour; and Day 3 considered the information needs of national and international agencies with a particular focus on synergies with on-going research on HIV treatment. At the end of the last day site leaders and their representatives met to consider future plans for collection and analysis of sexual behaviour data in the ALPHA sites.

Data collection: session 1 – paper-based methods

Partner loops (presenter: Simon Gregson, Manicaland) – The Manicaland survey team have used both direct questions about concurrency "How many relationships do you consider yourself to be involved in at the moment" and have also used a partner loop approach, in which respondents were asked to consider the person they had sex with most recently, and to provide information on dates of most recent intercourse with this person, and first intercourse; after answering a series of questions about that partner they were invited to consider their previous (next most recent) partner, supplying dates and same information for this partner. The number of partners included in the "loop" increased from last 2 partners in last month (rounds 1&2) to 3 most recent partners with no time limit in round 3. Questions about each partner in the latest survey include coital frequency (but only for those partners with whom the respondent had intercourse in the last two weeks), condom use (again restricted to very recent partners); the place where the first sexual encounter happened; the partner's age; whether partnership had lasted over a year; whether they are married to another person; and whether the respondent has given or received money for sex with this person. The partner loop questions also attempted to measure the amount of sexual mixing by individuals with different levels of education. An analysis of the data on sexual mixing suggested that older persons of higher SES faced an increased risk due to sexual mixing, whereas younger people tended to have sexual relations with people of comparable, or lower risk to themselves.

Calendars (presenter: Dermot Maher, Masaka) – In the general population cohort study MRC/UVRI were planning to use a partner loop approach (3 partners in last year) in their behaviour questionnaires, and to augment this with a simple (one-line) calendar to help the respondent locate the start and end dates of relationships. They then plan to get the interviewer to juxtapose the three calendars and ask direct questions about partnership overlap, probing for any other partners who may have been missed from the episode reports, particularly long-standing regular partners. The calendar method will be field tested in the run up to the next census, and the usefulness of this approach is expected to vary with the educational level of respondents – not all respondents will be familiar with a linear representation of time. For some respondents, reference to specific events – e.g. before or after Christmas, may be more useful than a calendar display.

Event histories (presenter: Caroline Kabiru, APHRC) – The research group designed a life history calendar—the Relationship History Calendar (RHC)—to collect 10-year retrospective

information on romantic and sexual relationship histories using a time-line format with a conversational interview style. They hypothesized the RHC would decrease social desirability bias and improve reporting of sensitive sexual behaviours compared to a more standard partner loop approach. A random sample of 1,275 18-24 year-olds in Kisumu, Kenya, were randomly assigned the RHC or the standard survey instrument. Results suggest that the RHC decreased social desirability bias and improved reporting on multiple measures of sexual behaviour. In particular, males were assumed to generally over-report sexual activities, and the RHC, as expected, produced lower reports of ever had sex and sex in the last year, lower mean number of lifetime sexual partners, and lower percentage of multiple lifetime partners compared to the standard instrument. Females were assumed to underreport sexual activities, and, as expected, the RHC produced higher mean number of sexual partners in the last year (marginally significant), higher percentage of multiple partners in the last year, lower mean age at first sex, and higher percentage of unprotected sex. In addition, the calendar method achieved greater rapport between interviewer and respondent and respondents enjoyed the interview more; however, the RHC took much longer to complete. The calendar method also presented greater challenges for data entry and analysis.

Frequency of intercourse (presenter: Emma Slaymaker, Kisesa) – Coital frequency data are very important for estimating risks of conception and sexually transmitted infections, for calculating consistency of condom use and number of condoms needed. The most commonly used question is time since last coitus, but this does not allow the estimation of an average frequency rate for an individual. At a population level the proportion reporting coitus "yesterday" in surveys gives an indication of an overall daily mean rate, but does not provide any measure of variability between individuals or over time: annual seasonality and variation according to day of the week are known to affect coital frequency – it is far from being a Poisson process.

Surveys which ask questions about frequency during a specified reference period (a week, a month or even a year) suffer from an excess of zero reports in the case of short reference periods (which do not allow rates of less than one per unit time to be calculated) and from heaping in the case of longer reference periods (whereby people estimate their "typical" frequency over a shorter time period and scale-up – so that monthly frequencies tend to be reported as multiples of four). If respondents are asked to report both a "typical" frequency, and the "actual" frequency for the most recent time period, "typical" frequencies are almost always higher. It is important to ask separately about sexual frequency with different partners for people who report more than one partner, especially if this information is to be used for estimating the condom use, which can vary between different partners.

There is more diversity between ALPHA sites in the measurement of coital frequency than in any other aspect of sexual behaviour. Future recommendations for this item is to include it in the partner loop, so it is asked separately for each partner; to ask about use in the period immediately preceding the last reported sexual act for that partner, and to use increasingly long reference periods to capture information from people who have sex infrequently.

Data collection: session 2 – other methods

Voting boxes (presenter: Simon Gregson, Manicaland) – The secret voting method developed in the Manicaland study is designed to reduce social desirability biases (SDB), by allowing

respondents to answer certain questions by marking their responses to questions (which are read aloud to the respondent by the interviewer) on a "ballot paper" which is deposited in a locked box, which cannot be seen by the interviewer. A formal evaluation of the method was attempted, after randomising respondents to face to face interviews (FTFI) or informal confidential voting interview (ICVI) by comparing the odds of reporting selected risk behaviours in those assigned to either interview method.

In the first survey round the odds of reporting high risk behaviours were significantly higher for men using ICVI than for those with FTFI. However, differences for women were not significant, and for men the differences largely disappeared in the second round. This is thought to be a result of favourable behaviour change (less risky behaviour to report means that it is harder to detect a significant difference) and a reduction in SDB as people learn to accept the research team, trust their non-judgemental attitudes and thus no longer seek to impress them.

Using PDAs (presenter: Eric Mgina, Mema Kwa Vijana study) – PDAs can be programmed to improve the quality of the data collected by imposing validity and range constraints on the fields comprising individual records, and eliminating the need for office based keying of data. In this study (a follow-up survey of youth who had originally been recruited in local primary schools, but who had now grown up and left school) the PDAs were used for the household census round (not the individual survey), and this helped to minimise the time needed between the listing and the main survey, thereby reducing problems of missed appointments due to people leaving the area between the listing and the main survey.

Practical problems encountered included a much longer lead in time to allow for development and testing of the instrument, and training of enumerators, the need for technical support in the field to deal with hardware and software problems, difficulties in obtaining spare parts, and the need to schedule periodic access to electricity to recharge the PDAs. An additional benefit was the ability to monitor progress of data collection in the field.

ACASI methods (presenter: Frederic Otieno, Kisumu) – Audio Computer Assisted Self Interview (ACASI) means using computers that "speak" the survey questions, which are answered by the respondent who chooses pre-coded responses shown on the screen. These methods enhance privacy and reduce social desirability biases, since there is no interviewer present. They ensure that questions are always put in a standard, neutral, non-judgemental fashion, but if the respondent does not understand the question there is little chance for further explanations. The method requires enough literacy to read and understand the pre-coded answers, and some confidence with handling a computer keyboard or touch screen – it is clearly less suitable in populations that have had very little exposure to computer technology.

In Kisumu ACASI has been used to collect behavioural data in the context of a prospective study to measure HIV incidence, enrolling 647 adults and 200 adolescents. They have compared ACASI with methods that involve an interviewer reading questions answered on the computer, and the respondents themselves reading questions displayed on the screen. They allow the respondents to select the local language to be used, and have looked into the effect of the gender of the pre-recorded voice. The ACASI questionnaire takes the respondent through a partner loop relating to the 3 most recent sexual partners, so interview completion times vary widely. Data analysis is ongoing, but the method for data capture allows the analysis to be done by time period, or in relation to specific events.

Household roster data (presenter: Basia Zaba, Kisesa) – To collect data that allow us to link information for cohabiting sexual partners does not necessarily require a complex survey instrument with careful efforts made to ensure confidentiality during reporting. A simple household listing can be used to identify the line number of a husband or wife (or common-law partner) residing in the same dwelling. Most of the ALPHA network partners conduct short household censuses as well as longer surveys incorporating bio-marker collection, studies of behaviours, knowledge, attitudes and various risk factors and of epidemic impacts. The household censuses are traditionally used to provide sampling frames for recruitment into the more complex surveys, to estimate participation rates, and to provide information on household structure. These rosters can also provide important data linkage information: (i) they can identify spouses and other cohabiting sexual partners, allowing us to compare bio-marker and behaviour information in couples and to verify the consistency of reporting of co-resident partners in detailed behaviour surveys; (ii) they can provide start and end dates for episodes of cohabitation that can be used to examine the plausibility and consistency of retrospective reports about start and end dates of partnerships and to calculate formation rates and dissolution rates for cohabiting partnerships; (iii) by identifying the mothers and fathers of individuals in the survey population they can allow us to construct a "co-parenting" network, which is a subset of a sexual partner network, and facilitate the study of cross-generational influences on behaviour.

Qualitative methods (presenter: Joyce Wamoyi, Kisesa) – To obtain a deeper understanding of the underlying explanations of sexual behaviour as understood by the respondents, a less structured approach is needed, whereby respondents are able to explain in their own words their own perspectives on the issues being studied, and explain what meaning is attached in their culture to certain behaviours. Such approaches, as well as being useful in their own right can help us prepare and analyse the results of structured surveys by alerting us to cultural sensibilities that will influence people's understanding and willingness to answer certain questions, by providing the right language and concepts for use in survey questions, by helping us formulate appropriate categories for coding responses and by discovering unexpected factors that influence behaviour which need to be investigated further. Most ALPHA sites have used a variety of qualitative approaches for specific studies, including in-depth interviews, focus group discussions, participatory methods, and observation, but the ALPHA agenda has never attempted to link such activities across the different sites. Research on concurrent partnerships may provide an opportunity to collaborate in qualitative studies – for example to describe the types of concurrent partnerships that are encountered in the different sites, and the degree of social disapproval or tolerance that they evoke.

Data collection: session 3 – hard to reach populations & difficult topics

RDS experiments (author: Richard White, presenter: Dermot Maher, Masaka) – Populations with high risk behaviour may be hard to reach through conventional household surveys either because they form a small minority so that surveys do not reach enough such individuals to generate statistically meaningful results, or because they are reluctant to admit to the behaviour that makes them different in the household environment, or because they are highly mobile and do not usually figure on the "usual resident" listing of household members.

Respondent Driven Sampling (RDS) methods are designed to use members of these hard to reach groups to recruit each other. RDS methods have grown out of "snowball sampling" used for qualitative research, but there is a renewed interest in new variants that claim to ensure that the data collected are representative. There have been few empirical studies to date to examine such claims in detail, and none in developing country settings. It isn't enough for RDS to be able to estimate the size of the population of interest, it must also be able to produce an accurate breakdown of its composition, and estimate presence of specific risk factors and estimate rates of specified behaviours.

Before attempting to apply RDS sampling to examine high risk minorities in the context of HIV spread, the MRC/UVRI study group is conducting an experimental RDS survey among an "easy to reach" group: coffee growers in the general population cohort in Masaka. The actual size and composition of this group is fairly well known from socio-economic questions in regular censuses, so the results of RDS sampling can be compared with this gold standard. Usual RDS procedures are followed, with the selection of seeds and recruitment of further waves of participants monitored using numbered tokens which also entitle the recruiters and recipients to participation incentives. Pre-pilot results suggest that recruitment can be very fast, but that eligibility among recruits is low. Analysis of bias in recruitment includes looking at gender, religion and ethnicity, and an examination of whether weighting by degree of network connectedness improves representativeness.

Illegal behaviour (presenter: Dermot Maher, Masaka) – Collection of data concerning behaviour that is illegal in a given national jurisdiction (such as injecting drug use, under-age sex, homo-sexuality or failing to disclose HIV infection status to a sexual partner) poses ethical problems that go beyond the difficulties of collecting data on stigmatised behaviour, especially if the law places an obligation on people who know about illegal behaviour to report individuals who engage in it to the authorities, as this renders interviewers liable for prosecution if they observe the confidentiality commitment that they make to the respondent. Recent draconian legislation proposed in Uganda and some other East African countries concerning homosexuality may make it impossible for us to collect data on some factors that are known to increase exposure to risk, but other illegal behaviour, such as sex with a minor, may be easier to include in routine surveys. When considering the ethical aspects of collecting such data we need to follow the usual ERB guidelines that follow the Helsinki declaration on medical research ethics, and think about factors such as: respect for person being interviewed; overall benefits and harm that may accrue due to the research; and the just spread of benefits and harm. A step-by-step approach is required, with wide community consultation, engaging key allies and building trust. In the case of an obligation to report illegal behaviour enumerators may have to consult their own consciences about such disclosure, and it may not be fair to employ people with doubts or fears concerning such obligations. Some studies have used members of the marginalised groups (IDUs, MSM) to interview their peers, but such a study design may be impossible to get permission for in a local ERB.

Use of mobile phones (presenter: Marelize Gorgens, World Bank) – Collecting data through mobile phones minimises social desirability bias and can be very cheap, since the respondent and the "interviewer" do not have to meet. Mobile phone ownership is increasing very fast throughout Africa, and in South Africa it has reached the same overall levels as in the US. The biggest remaining drawback is lack of representativeness when phone ownership is not

widespread in the community, but the methods may still be appropriate for sub-populations including some traditionally difficult to reach groups, such as itinerant workers, in which phone ownership is higher than in more settled groups. Young people living in urban areas in particular may be more ready to use this method, as it is a fashionable means of communication, and urban youth are generally under-represented in household surveys.

Different technologies for data capture include (i) simple SMS text messaging – but this is somewhat cumbersome, could be difficult to keep potential respondents involved, and may involve a lot of editing of inaccurately keyed responses; (ii) Unstructured Supplementary Service Data (USSD) – a secure data exchange format that is available even on old fashioned phones, as used in mobile phone banking transactions - a small display could handle up to 10 questions in a pseudo-interactive format; (iii) verbal call back with Inter-active Voice Recognition (IVR) in which the respondent is interviewed over the phone using a form of Audio Computer Assisted Self-Interview (ACASI) system. The last system is the most expensive to set up, but the least cumbersome for the user. In each case the user may be rewarded for their participation by crediting the cell phone with air time. New problems anticipated include screening out responses from other users of shared phones, loss to follow-up due to theft and loss of phones, but benefits include obtaining data in real time. It is worth noting that mobile phone survey technology can also be used for programme monitoring and service coverage, and has achieved a high degree of approval in South Africa.

Discordant couple studies (presenter: Joseph Kagaayi, Rakai) – Discordant couple studies are very important as they develop our understanding of those at highest risk of becoming infected if the relationship is one in which sexual intercourse occurs regularly. The ethical and practical difficulties of organising such studies include identifying couples for study, obtaining informed consent, protecting the uninfected partner and avoiding stigmatising the study subjects.

The objectives of the Rakai study of discordant couples were (i) to determine whether frequently exposed but sero-negative sexual partners of HIV-infected individuals in fact carry extremely low levels of HIV that could be detected by highly sensitive PCR and micro co-culture assays; and (ii) to examine the viral strains in the HIV-infected partners of transmitting vs. non-transmitting couples to determine whether infectiousness, viral subtype, viral fitness, and capability to infect activated CD4+ T cells in vitro are responsible for transmission vs. non-transmission. To this end, the study aimed to recruit 20 discordant couples, 20 concordant positive and 20 concordant negative couples. Potential participants were identified from databases of previous studies, including the community cohort study, in which participants had agreed to further contact by research teams. Inclusion criteria were: age 18+, continued sexual activity within the partnership; partnership duration of 2+ years, known sero-status for both partners, CD4+ counts >250/µl and plasma viremia > 5,000 copies and not yet on ART for infected partners; willingness to provide informed consent and continued participation in a couple counselling programme. Couples were withdrawn from the study if these criteria were violated after the start. The study provides free HIV counselling and testing, free treatment for curable STDs, free condoms, health education, treatment of HIV-related conditions and access to ART if indicated according to WHO standards (services provided through mobile clinics). Among the limitations of the study were: the small numbers recruited, and the inability to get information on secondary partnerships. In the end, 44 couples were enrolled: 20 discordant, 14 concordant positive and 10 concordant negative; all are still participating after second follow-up (90 days after enrolment).

Among the new challenges that will be faced by ALPHA sites wishing to start discordant partner studies in future will be identifying eligible couples not yet on ART in view of changing ART eligibility criteria, and doing research on outcomes other than transmission rates, as enquiring about sexual behaviour outside of the partnership being studied is likely to be unproductive when the couple are subject to intensive counselling and are aware that their partners are being interviewed by the same research team.

Analysis: session 4 – concurrent partnerships

Introduction (presenter: Basia Zaba, ALPHA) – Concurrent partnerships have been hypothesised to be a major factor in explaining why epidemics of different magnitude arise in different populations. Analysis of concurrency has been beset by difficulties of definition and measurement. The definition recently adopted by UNAIDS is based on sexual intercourse: a concurrent partnership is an overlapping sexual partnerships where sexual intercourse with one partner (partner B) occurs between two acts of intercourse with another partner (partner A). This is a simple and unambiguous definition, which does not privilege marriage: a partnership is simply the length of time between the first and the latest act of intercourse between the partners. The definition is not time limited or frequency dependent: it does not matter whether or not sexual intercourse with partner A occurs repeatedly between the first and latest acts, and it does not matter how much time elapses between acts of intercourse with one partner and the other. The simple definition therefore adds a measurement challenge (going as far back in time as is necessary to capture the information about first sex with partner A), and includes partnership overlaps which will not be associated with an appreciable increase in risk of STI transmission, because the time interval between sexual acts is so large that it exceeds the infectious periods of most STIs.

As well as adopting this standard definition, UNAIDS recommended a standard approach to measurement: a partner loop questionnaire covering at least the last 3 partners in the last 12 months. UNAIDS also proposed standard indices for quantifying the scale of concurrency: a point measure – the proportion of all individuals in concurrent relationships at a point in time 6 months prior to the survey date (at the mid-point of the 12-month reference period); a cumulated measure – the proportion of all individuals who had any concurrent partnership in the last 12 months; and a relative measure – the number of individuals who had concurrent partnerships in the last 12 months as a fraction of individuals who had multiple partnerships. The reason for using a reference point 6 months prior to the survey is to avoid depending on a subjective evaluation by the respondent of whether the relationship is still ongoing (i.e. whether sexual intercourse with that particular partner is likely to occur again). The point measure will capture the prevalence of long-term concurrent partnerships, the period measure (which will always be higher than the point measure) will additionally capture short term concurrent partnerships. Both may be limited by the number of iterations of the partner loop.

The increased risk posed by concurrent partnerships (over and above the risk posed by multiple serial partnerships) is experienced not by the individual who engages in concurrent sexual relationships, but by their partners. Analyses of impact on HIV incidence therefore need to focus on the experience of partners – at an individual level this means being able to use the survey instrument to identify sexual partners, and measure changes in their HIV status – in most survey settings this would only be feasible for cohabiting partners, or in some cases wives of polygamists who are identified as a household head in more than one household. At a community level, HIV trends in women should be correlated with the extent of concurrency reported by men and vice-versa.

In terms of prevention campaigns, it is not clear whether it is desirable to construct messages urging people to specifically avoid concurrent partnerships as opposed to avoiding multiple partnerships in general.

DHS survey analysis (presenter: Emma Slaymaker, Kisesa) – DHS questionnaires since the early 2000s have used a partner loop approach for collecting information about the last 3 sexual partners in the last year. The version of the questionnaire used in the second half of the decade, included a question about how long since last sexual intercourse with each partner (in days, weeks or months), and a question about the length of the partnership (days, months or years) which is skipped for marriages. This allows us to calculate an approximate date of the "end" of non-spousal relationship in terms of last sexual act, but the date of the start of the partnership is somewhat ambiguous, because it is not clear whether the respondent would be counting back from the interview date (in the case of a relationship that was perceived as ongoing) or from the date of the last intercourse (in the case of a relationship that was defined, in the eyes of the respondent, by acts of intercourse), or some date in between (in the case of a relationship, whose beginning or end might be dated by events (e.g. betrothal, death of the partner) that do not correspond to acts of intercourse). There is no specific question about the date of the first act of intercourse with any of the recent partners. DHS questionnaires also ask about condom use in each recent partnership, and some include questions on the use of alcohol at the time of last intercourse, and the approximate age of the partner.

There is a check question on total number of partners in the last year that allows us to calculate how many recent partners do not have details recorded in the partner loop. Estimates based on four recent DHS surveys in Southern and Eastern Africa (Zimbabwe 2005, Uganda 2006, Zambia 2007 and Namibia 2007) show that fewer than 1.5% of recent partners are omitted from the partner loop because of the "last 3" restriction. However, earlier versions of the DHS questionnaire did not ask how long ago last intercourse occurred with any but the most recent partner – this made it impossible to measure concurrency without additional assumptions. The current standard questionnaire (in use from 2010 onwards) includes information about the last sex with up to three recent partners and the length of the relationship with each partner, including spouses.

In earlier versions of DHS questionnaires the date of the start of the first marriage is recorded in a separate part of the questionnaire (but not the end date for marriages that have ended), and there is no information about start and end dates of later marriages. For polygamously married men only one marriage start date is recorded, even though the presence of several spouses in the same household may be indicated from reported line numbers of spouses. Information on start and end dates will be available from 2010 onwards for spouses reported in the partner history.

Because of the ambiguity around start and end dates of marriages, the current version of the DHS questionnaire does not allow an accurate classification of concurrency for currently married individuals (including polygamists) who had been married more than once. The number of respondents affected by this ambiguity ranged from 1% in Namibia to 12% in Uganda. If all such individuals were omitted from the analysis, this would under-estimate concurrency. Alternatively various assumptions can be made about the start dates of marriages other than the first: e.g. we could assume that start dates for second marriages were evenly spread between the first marriage date and the interview date, or that the duration of higher order marriages was the same as the mean duration of current first marriages.

Bias and selectivity (presenter: Stan Becker, Johns Hopkins) – Statistical analyses of sexual networks may need to use the partnership, as opposed to the individual, as the unit of analysis. However surveys typically use households as a sampling unit, so special considerations are needed to avoid biases due to selection effects and clustering. Sexual behaviour is not the only outcome that has been studied at a partnership level: couple data have been generated from household surveys to look at fertility intentions and outcomes. In the study of fertility, casual partnerships, especially those in which only one act of intercourse has occurred, are often deliberately excluded from the analysis, in so far as childbearing intentions and contraceptive use patterns associated with such intentions would not have been established in relationships of this type. In the study of HIV transmission such partnerships may be of particular interest, especially their degree of connectedness to other partnerships in the network. Household surveys are very unlikely to identify both sides of couples involved in short term relationships, so that partnership based analyses from such surveys are biased towards cohabiting couples, and to those in which both members are present to answer questions. DHS publishes stratum specific sampling probabilities for weighting individual data to make it representative of all individuals in the population, and males and females in the same household may have different sampling weights, because response rates differ by sex. To analyse data on cohabiting couples adjusted for non-response we need to derive special couple weights. Couple response rates are always lower than response rates for either sex separately, and since absences of partners are not independent, non-response at a partnership level is not random. We should be aware that the absence of an individual from the household at the time of a survey may be connected with their involvement in sexual partnerships with persons not resident in the household.

Information on short-term partnerships may be obtained in the form of retrospective reports by individuals, but the absence of such partnerships from the cross-section that may be classed as "current" in a survey, means that we are limited in our ability to characterise them fully. A sexual partnership based on co-residence can safely be accepted as current for analysis purposes if both members identify one another as sexual partners (e.g through consistent reporting of line number of spouse), but when a non co-resident sexual partnership is described as "current" this may represent a hope or intention which may not be realised, and for which we have no confirmation from the other person involved. Sex-specific reporting biases of the characteristics of the partnership (such as condom use, coital frequency) can be estimated for co-resident partnerships, where both partner's reports are available, but this is not possible for non co-resident partnerships. Social desirability biases may lead to serious under-reporting of non co-resident partnerships and condom use by women, there is some suspicion that men may over-report such partnerships, as well as condom use.

Analysis: session 5 – partnership turnover

Partner acquisition rates (presenter: Milly Marston, Kisesa) – an alternative approach to measuring behavioural risk is to look at individual's partner acquisition rates, analysing data on formation of new partnerships, using an age-specific approach to generate synthetic cohort statistics along the same lines as standard demographic indicators such as total fertility rate or life expectancy. A limited measure of lifetime concurrency may be obtained using this approach if partner acquisition rates are broken down by current marital status as well as age, and a more complete measure could be obtained if it is possible to classify the respondent by current partnership status. Partner loop data may be suitable for this purpose.

Lifetime partners (presenter: Jeff Eaton, Imperial College) – Three different ways of estimating the age-specific partner acquisition rate were suggested. The first method is a simple average of the number of new partners acquired in the last year by all the respondents in a particular age group. The required data could be obtained in a cross-sectional survey by a direct question such as "how many new sexual partners did you have last year", or it can be obtained from a partner loop approach, provided that all the sexual partners in the last year are included in the loop – the number of partners for whom date of first sex is within 12 months of the interview will be counted as new partners. Another way of obtaining the same information is to ask about the total number of sexual partners in the last year and then ask how many were new. Direct questions on new partners in the last year have not been tried in many surveys. The second method would require longitudinal data, and the number of new partners for an individual would be derived from the difference in the number of lifetime partners between successive survey rounds, and the person years lived by individuals between rounds would be summed to provide a denominator for the rate. Data on lifetime partners are commonly collected, but at an individual level this method might produce anomalies if some individuals reported fewer life time partners at the later survey round. For individuals crossing an age group boundary between survey rounds an arbitrary decision would have to be made about whether any new partners were acquired in the initial or final age group. The third method would require the assumption of constant behaviour over time, calculating the rate at which new partners were acquired between age groups by subtracting the differences in mean number of lifetime partners in successive age groups, assuming a five year exposure between age groups. As with method two, some way of translating the data into rates in conventional 5-year age groups would need to be devised, as looking at changes in mean lifetime partners between age groups yields rates that are centred on the age group boundaries, this is equivalent to the considerations in P/F cumulated fertility analysis.

The performances of the methods were compared using Manicaland data: both in terms of estimating levels and changes over time (between rounds). Although the methods yielded different estimates of ASPAR, the differences were not consistent over survey rounds or between sexes: for men in round 2, method 2 produced much higher estimates of ASPAR than the other two methods, and method 3 produced somewhat lower estimates than method 1; whilst for women method 3 produced lower estimates of ASPAR and methods 1 and 2 were in agreement; at round 3 for both men and women method 1 yielded slightly higher ASPAR estimates and the other two methods were consistent. Methods 1 and 2 suggested falling ASPAR over time, with a larger fall for men than for women. (Method 3 was incapable of detecting such a trend because of the assumption of stable sexual behaviour over time.) All the methods suggested higher ASPAR for men than for women, and different age-specific patterns: for men ASPAR tended to decline steadily with age; for women there was a suggestion of a slight peak in the late 20s.

Estimates of ASPAR based on method 1 (which do not rely on differences between reports at different time points) intuitively seem most robust, but it would be better to estimate these rates from information in partner loops than to ask directly about new partners, as there is less chance of a partner being misclassified as "old" in a particular year if the date of the first intercourse is obtained separately for each partner. However, to yield unbiased results for ASPAR estimates, the partner loop should not be limited to the last three partners, but ask people to report on all partners with whom intercourse occurred in the last year.

Assortative mixing (presenter: Jim Todd, Kisesa) – The extent and speed with which an STD spreads across a sexual network depends on whether individuals with just one sexual partner tend to form mutually monogamous partnerships (assortative mixing), or if they are often paired with individuals with multiple partners (disassortative mixing). Theoretical models have shown that initially infection spreads more rapidly in the former case, but reaches a lower plateau as the highly connected part of the sexual network becomes infected and those who are mutually monogamous are not affected. Data that allow analysts to link the partner acquisition reports of sexual partners allow us to obtain an approximate estimate of the degree to which partner choice is assortative and to relate this to the risk of acquisition of HIV.

The Kisesa demographic surveillance system (DSS) allow us to identify cohabiting sexual partners, so can analyse the degree to which cohabiting partners are assortative on various characteristics (including multiple partnerships), although we cannot extend the analysis to non-cohabiting unions, even when the partners are married and the unions are of long standing. Since marriage in Kisesa is patrilocal, it is easier to identify men who have had more than one co-resident sexual partners (19% over the 6-year period from 2002-08) compared to women (3% over the same time period). The internal migration reconciliation work currently under way will increase the proportion of serial cohabiting partnerships identified for women.

Since partnership characteristics are reported in a different survey setting (a behavioural survey conducted in the temporary sero-survey village clinic), the DSS can be used to assess the quality of reporting about partnerships: 3% of men and women in cohabiting partnerships (including marriage) reported that they did not have a cohabiting partner; 19% of women and 4% of men living in polygamous households where both wives were co-resident failed to report the polygamous nature of the marriage.

Bearing in mind this caveat about the quality of reporting about the co-resident partnership (which we would expect to be more completely reported) no evidence was found of assortative mixing in terms of non-marital partnerships, with very low levels of correlation (0.025 and 0.01 respectively) between reports of regular and casual partnerships between men and women in cohabiting unions, contrasting sharply with high levels of assortative mixing with respect to socio-demographic characteristics such as literacy (correlation 0.28). No relationship was detected between HIV incidence or prevalence and cohabiting partner's risky sexual behaviour.

Analysis: session 6 – sexual networks

Local network methods (presenter: Basia Zaba, Kisesa) – Data on characteristics of sexual partners collected in partner loops can be analysed using the "local network" paradigm, which allows us to limit the analysis to those respondents and partners who satisfy the eligibility criteria (typically residence and age) for the survey. Comparing the reports of male and female respondents can shed light on sex-specific reporting biases. An application of this technique in Kisesa in 1997/98 revealed a high degree of under-reporting of sexual partnerships by women relative to men. However, more complex patterns of misreporting were also revealed: women tended to report much longer durations of partnerships than men, and had a propensity to regard past relationships with men of a higher socio-economic status as still continuing. A high proportion of women who lived apart from their regular partners classified themselves as married, much higher than the number of men who acknowledged such women as their wives, rather than long-standing girl friends. Although overall numbers of partnerships were under-

reported by women, there was a much stronger relationship between HIV status and number of life time partners for women than for men.

Since this type of analysis does not require any more data than what would be collected through partner loops used to identify multiple partnerships, it would generally be useful to do this at all sites in order to discover whether these misreporting patterns were typical, or peculiar to Kisesa. Identifying reporting errors in closed local networks will assist us in interpreting partnership data from each site as a whole.

Respondent driven sampling (presenter: Sam Clark, ALPHA) – RDS sampling has been used extensively to collect data on high risk behaviour in hard to reach populations. RDS is a structured form of "snowball" sampling, which attempts to identify a representative sample of the target group of interest. A small convenience sample of "seeds" from the target population is used to identify others in the target group, and recruitment into the survey is managed through a numbered coupon system which records recruitment success and provides a management structure for participation incentives whilst maintaining anonymity. Recruits are then given coupons to recruit more people from the target group, producing waves of recruits, the process is halted when the proportion of new recruits in a higher order wave falls below a pre-determined small, fixed quantity, at which point theoretical considerations suggest that the sample is representative of the target group.

RDS also identifies the network of links between individuals in the target population, so it has been suggested that the approach might be useful for describing sexual partnership networks in the general population. However, there are theoretical considerations that suggest that such estimates may not be totally reliable if links between individuals do not follow a Markov chain random model, specifically that selective behaviour may guide people's choices about who to nominate as possible recruits, and the variance around point estimators based on groups that are connected to only part of the total target group is so large that the estimators become totally unreliable.

Furthermore, the people who have untypically large numbers of sexual partners need not form a socially cohesive sub-group whose members can identify one another – in fact in a population with assortative mating we would not necessarily expect them to be directly connected. Since Demographic Surveillance Sites embedded in each of the ALPHA partners provide a ready-made reliable sampling frame, it suggested that sampling or censusing the population is a better approach to identifying high-risk groups with multiple hetero-sexual partners than RDS. In certain cases DSS sites might be used to test the representativeness of samples drawn by RDS, prior to using RDS methods in wider populations, although if the populations in question were very small minorities, the number present in a DSS site might not be large enough to profile with much certainty.

Analysis: session 7 – ecological & individual level

Polygyny (presenter: Georges Reniers, Princeton) – Polygyny has been shown to be associated with an increased risk of HIV positive status at an individual level for second wives, but at a population level (nationally, or at the level of household clusters in DHS surveys) there is no excess risk associated with high levels of concurrency in the population, in fact there is an indication of a significant protective effect for both sexes, even after allowing for confounders

such as cluster location, percent of males circumcised, median age at first marriage, median age at sexual debut, percent reporting extra-marital sex and percent reporting STIs.

The mechanism responsible for this conundrum (at the individual level) is thought to be adverse selection, whereby widows and women at higher marriage orders (with high HIV risk) are more likely to become second wives. However this would only explain the negative ecological correlation if there was pronounced assortative mixing, and the evidence for this is weak. The network structure of polygamy, which is gender asymmetric leads to a slower growth of the epidemic than in a situation of gender symmetry with respect to concurrent partner formation, but this does not explain the protective effect of polygamy at the community level, as asymmetric concurrency would be expected to produce faster epidemic growth than monogamy. Another mechanism that could explain the protective effect at the community level is coital dilution: women in polygynous unions, particularly first wives, report significantly lower rates of coital frequency than women in monogamous unions.

Policy relevance: session 8 – ART context

ART impact assessment (presenter: Mary Mahy, UNAIDS) – Current WHO treatment guidelines recommend that ART is started at a CD4 count of 350, which would imply that over 40% of HIV infected adults will soon be eligible for treatment in countries with mature epidemics. The measurement of sexual behaviour is critical in the context of ART roll-out, because of the widespread fear of behavioural disinhibition associated with the perception that HIV is no longer a death sentence, which could adversely affect sexual behaviour in the community as a whole, and in HIV infected individuals and their regular partners in particular. It is also of interest to see whether the protective effect of ART which lowers viral load among infected persons will overcome any lessening of condom use, especially in long-term discordant partnerships.

There are many challenges to linking clinic data and data collected in the community in sites belonging to the ALPHA network – some possible approaches might include the use of finger print identifiers, fuzzy name matching, accessing patient identification codes in national registers, and direct questions to respondents: “Are you receiving ART treatment?”. Although ethical objections have been raised to the latter approach it has been used in a recent AIDS indicator survey in Kenya, and proved to be remarkably accurate (in the sense of producing an estimate of proportion receiving treatment that corresponded closely to aggregated clinic data held by the treatment programme.

Knowledge of HIV status (presenter: Simon Gregson, Manicaland) – Campaigns to promote Voluntary Counselling and Testing (VCT) stress that knowledge of HIV status in itself will promote more responsible sexual behaviour: because of a desire to stay uninfected amongst those who test negative, and a desire to protect their partners from infection by those who test positive. This hypothesis is investigated using 3 data collection rounds of the Manicaland cohort study, between 1998 and 2005, in which data on sexual behaviour were collected using the “voting box” method, and participants were offered free VCT (as well as providing blood samples for research testing). VCT services were also available at testing centres in the area between survey rounds. Behavioural outcome measures included visiting bars and beer halls, new sexual partner acquisition, number of sexual partners and concurrent partnerships and

consistency of condom use in different partnerships. Changes in behaviour were compared before and after VCT, and between those who received VCT and those who did not.

Considerable declines in risk behaviour were observed over the period in the population as a whole, and for infected men no additional beneficial behaviour change was attributable to VCT, but infected women who had VCT reduced the number of new partners more than those who did not test, and more than uninfected women who had VCT. It is important to note that ART is not yet available in this site, which means that uptake of VCT relatively low (<10%), although levels of disclosure following VCT are generally high (around 80% among both positive and negative clients).

Linking to facility data (presenter: Alison Wringe, Kisesa) – the need to relate sexual behaviour to ART and VCT use will bring about increasing demands for linking facility-based data (with reliable estimates of dates of access and type of service used) and community-based data (that provide a historical overview of marital status change and sexual behaviour). As well as possibly providing further data on sexual behaviour, facility data are essential for investigating factors associated with access to VCT and ART and effectiveness of referral systems, and for understanding delays in accessing care and treatment services.

To interpret the epidemiological meaning of HIV prevalence estimates from VCT centres we need to be able to distinguish between first time and repeat testing in the community, and have reasonably reliable estimates of the proportion who have ever tested by HIV status. Understanding the link between risk behaviour and repeat testing by HIV negative individuals, and denial or disbelief and repeat testing by HIV positive individuals will help in the interpretation of data from VCT centres.

Linked data from facilities and community surveys are more valuable than relying on surveys alone, since (i) documented access to HIV services removes social desirability reporting bias; (ii) dates will not be subject to recall bias, making it easier to ascertain frequency of service use and compare reported and documented use; (iii) referral data make explicit how a person came to use a particular service; (iv) can obtain richer data on technical measures such as CD4 count; (v) it is more ethical to link data than to have interviewers asking questions that will reveal a person's HIV status.

However, there are many challenges in linking data. Many of the clinics and test centres serving populations living in ALPHA study sites do not have electronic data capture systems, but keep data in registers and log books that contain names and other identifying information that is supposed to be kept confidential by counsellors and clinic staff. Client confidentiality requirements make our ability to form matches (e.g. based on name and residence information contained in clinic records) extremely difficult. One approach is to train clinic staff (VCT counsellors and ART record keepers) to perform the links using special name search facilities in the community data base, to attach the relevant information, and then to encrypt the linking information before the linked files are handed over to the analysts. Only counsellors have the encryption key, so they can check and edit matches in future for returning clients, analysts and data managers can only use the linked data set without being able to see any information (such as name, exact address, exact DoB) that would enable personal identification.

Partner notification (presenter: Tony Ao, MITU) – Useful data on sexual partners of individuals attending clinics dealing with sexually transmitted infections can be obtained from partner

notification procedures, provided that these are designed in such a way that we obtain limited profiles of partners who are not traced or who do not respond to the invitation to attend the clinic. Partner notification can be effected through the patient or the service provider, or by some joint arrangement. Research (mainly outside of SSA, and mainly focussed on STIs other than HIV) has shown that supportive counselling and joint procedures are more effective than leaving it to the patient alone to effect partner notification. In some Eastern and Southern African countries in which ALPHA sites are located (Tanzania, Kenya, Zimbabwe), there is a legal obligation on an infected person to inform their sexual partner, but in Uganda it is up to the client to decide, after receiving supportive counselling to facilitate partner notification. Research questions that ALPHA might get involved could include operations research into effectiveness of different types of partner notification schemes, and ethical issues affecting pressure to disclose infection status including confidentiality, stigma and personal safety.

Policy relevance: session 9 – National & international data needs

Tanzanian government perspective (presenter: Mary Kibona, CDC) – The requirements of national agencies (such as NACP, MoHSW) for sexual behaviour data are dictated both by practical planning needs, the need to monitor the impact of behaviour change campaigns, and the need to report standard indicators to donors and international agencies. Challenges include: timeliness – by the time research study results are published it is often too late for policy makers to use the findings in evidence based programming; few links between researchers and policy makers so that relevant data are not collected or not published in the accessible form; limited capacity in the ministry to locate, interpret and review data needed for policy development. The GoT is able to leverage assistance from foreign donors to address these challenges, and suggest an engagement with researchers to establish a national research agenda, and ensure triangulation between relevant data sources.

Key questions for the GoT include: (i) What are the drivers of the HIV epidemic in Tanzania? (ii) What are the geographic differences in levels and trends in HIV prevalence in relation to related risk behaviour? (iii) How do the drivers relate to the access, intensity, and reach of prevention efforts? In addition, the data available on Most at Risk Populations (MARP) are very sparse, and there is a lack of evidence about the proportion of new infections that occur in such groups. Surveillance sites, such as ALPHA members, may be able to help evaluate government led interventions, and could benefit from including policy makers and government officials on their steering groups.

UNAIDS requirements (presenter: Peter Ghys, UNAIDS) – The interest of UNAIDS in sexual behaviour data stems from a need to understand the impact of sexual behaviour on epidemic spread and to evaluate the role of behavioural interventions in limiting this. The ultimate aim is to have reliable estimates of the number of new cases by mode of transmission. To guide future interventions the information needs to be broken down not just by whether the infection was sexually transmitted, or from mother to child, or through illegal injecting drug use, or in the course of medical procedures, but sexual transmission (especially in generalised epidemics) should be capable of being broken down by infections occurring to sex workers, clients of sex workers, husbands of sex workers, wives of clients of sex workers, or persons who have had no direct contact with the world of commercial sex. The last category could usefully be broken down by whether the individual or their partner was involved in multiple serial or

concurrent partnerships. This information also feeds into the models that are used to project the epidemic. An important role for ALPHA sites is to furnish evidence on age-specific incidence patterns, but also how and from whom infections were contracted. Indirect estimates of incidence based on cross-sectional surveys cannot provide evidence of this sort.

UNAIDS advocates inclusion of three items in partner loop questionnaires: date of first and last sexual intercourse and whether or not the partnership is still ongoing. Indicators to be calculated from these data should include point prevalence of concurrency, cumulated incidence of concurrency over last year and proportion of multiple partnerships that are concurrent. The new sexual behaviour format of DHS questionnaires allows these indicators to be calculated, and ALPHA sites should consider adopting the DHS approach as a minimum set of core questions. Additional questions recommended by UNAIDS include: partner type, partner age, condom use in this partnership, coital frequency, and partner residence.

Methodological research suggested for ALPHA sites includes (i) investigation of the reliability of the question "Are you still having sex with this person?" because if it turns out to be reliable, it will offer easier and more current estimate of point prevalence; (ii) investigating completeness and accuracy of "sexual partner histories" and developing methods for improving date recall; (iii) designing methods for reducing social desirability bias, including novel survey technologies; (iv) improving instruments for measuring condom use and coital frequency. Epidemiological research should include (i) establishing an empirical relationship between concurrency and HIV transmission in sub-Saharan Africa; (ii) understanding different types of and reasons for concurrency and the level of transmission risk associated with each type.

Following the Nairobi meeting on concurrency, the following conclusions were presented to the Monitoring and Evaluation Reference Group (MERG): (i) prevention programs targeting concurrency create an urgent need for consensus indicators for measuring concurrent partnerships; (ii) adoption of the standard definitions, questions and indicators will enable evaluation, comparison and promotion of prevention programs; (iii) validation and improvement of current tools for sexual behaviour surveillance is needed; (iv) further research is needed to understand the context of concurrent partnerships, and to relate concurrency and HIV transmission. Participants of the Nairobi meeting will undertake the publication of a paper in a scientific journal to summarize the recommended indicators and their measurement. UNAIDS will develop and disseminate detailed guidance on how to handle missing and conflicting data when calculating the indicators and recommend the implementation of relevant questions in household surveys, and will promote the above research agenda including support for investigations undertaken by the ALPHA network.

Synthesis of materials provided by sites undertaken by Emma Slaymaker after the conference:

a) **a comparison of different partner loop constructions**
b) **partner types used in different ALPHA sites**

(A) Collection of data on sexual partners in the recent past: How does limiting the number of partners and/or the time frame for a partner history affect the analysis of the resulting data?

Collect information on the last three people the respondent had sex with, in the 12 months before the survey.

This is the conventional approach, used by DHS/AIS and many other surveys. In theory, by imposing limits on the reference period (12 months) and the number of partners (3) the resulting data are biased because they do not accurately represent the partnership experience of the study population: the experience of people who have had 4 or more partners in the last year is only partially represented. To be unbiased, the partner questions should be asked for **either** all the partners in the 12 months before the survey **or** the last three partners regardless of time. The 'three partners in the last year convention' does have its advantages despite the bias. Recall is likely to be better for partners in the last year and for more recent partners compared to those from further back in time or partner order. Collecting data on a maximum of three partners keeps fieldwork time down.

In practice, three partners is adequate for almost everyone. In most African surveys less than 1% of the sample reports four or more partners in the year before the survey. However, that 1% is probably the most interesting section of the population when researching STI transmission.

There are therefore three different formats for the partner history:

Format A) ask about the last three partners in the 12 months prior to the survey

Format B) ask about the last X partners regardless of the time (X can be any number)

Format C) ask about all the partners in the Y months prior to the survey (Y can be any number)

The table below summarises the strengths and weaknesses of the three different formats:

	A) Last 3, last year	B) Last 3*, any time	C) All in last year†
Fieldwork time	Least	Most	Middle
Completeness	Incomplete	Complete	Complete
Ease of recall	High	Low	Middle
Repetition (likelihood of collecting information on the same partners at different rounds)	Least	Most	Middle
Calculation of standard indicators	Some problems	Some problems	Possible
Calculation of concurrency measures	Some problems	Some problems	Possible
Calculation of ASPAR	Possible	Possible	Possible

*Could be any number of partners; †Could be any time frame

Fieldwork time

The fieldwork time will be affected by the criteria used when collecting a partner history. Format A requires the least fieldwork as data are collected for a maximum of 3 partners, and fewer than 3 partners for most respondents. Format B entails the most fieldwork as a greater

proportion of respondents will report three partners. Format C entails a bit more work than Format A but not much: the only respondents reporting extra partners are those who had 4 or more in the last year. Format C probably raises the most problems for paper based questionnaires where one must balance wasted paper against the potential for losing additional sheets.

Completeness

Format A suffers from a truncation bias because two limits are imposed on the history: time and number of partners. Formats B and C are both complete.

Recall

Format A is probably the easiest to recall since the history covers at most three recent partners. Format B is probably the hardest for some respondents since the second and third partners, if they had them, may be several years ago for someone who has been monogamously married for some time. Format C has the advantage of confining recall to the recent past but may be difficult for respondents who have had many partners in that time.

Repetition

For cohorts a complication, or perhaps benefit, of the partner histories is that the same partner may be reported in different surveys. Whilst some sites identify cohabiting partners at some point during data collection and processing nobody has yet done this in the partner history. It is perhaps worth noting that Format B is most likely to elicit reports on the same partner at different survey rounds.

Standard Indicators

The standard sexual behaviour indicators used for national and international monitoring and evaluation activities have a 12 month reference period. This is fine for Formats A and C (so long as first and last sex can be dated) but might be problematic if Format B is used. The problem would arise for respondents whose last three partners occurred in less than a year before the survey. For indicators with a 12 month denominator, there may be some uncertainty as to how to treat respondents for whom there is no data for a portion of the 12 month reference period.

Concurrency measures

Formats A and B pose potential problems for the calculation of concurrency measures. Concurrency measures are, by their nature, defined by time. Since formats A and B are limited by number of partners they do not give a complete enumeration of partnerships for any set period of time. This means that some respondents will have grey areas in the reference period for concurrency measures during which we do not know whether or not they had concurrent partners. Respondents who exceeded the number of partners specified for the history, in less time than the reference period for the concurrency measures, will have this problem.

Measuring partner acquisition

It is possible to calculate measures of partner acquisition from all formats. However Format C is the best for this analysis because the data are complete for a period of time and, by extending the reference period, the precision of the estimates can be improved. Because the analysis uses only partners acquired in the reference period the effective sample size is quite small. Formats A and B provide data on fewer new partners than Format C because Formats A and B

omit the data on partners 4+ for respondents who have had more than three partners. It is also simpler to calculate the partner acquisition rates from Format C because each respondent reports for a full year so the person time for analysis

(B) Descriptions of partners used in ALPHA sites

This document is based on the questionnaires collected from the Phase 1 Alpha sites (ACDIS, Karonga, Kisesa, Manicaland, Masaka, Rakai) at the extra ALPHA meeting in Mwanza in December 2009.

Some of these questionnaires were already in use, others were about to go into the field. See http://www.lshtm.ac.uk/cps/alpha/workshops/members/wUNAIDS_conc/qweb/What_is_on_here.htm for a summary and links to the relevant questionnaires.

It deals with the terms used to describe partners in the sections of the questionnaire relating to recent partners, the partner histories. I've not collated the information on partner types from other sections of the questionnaires because they are largely context specific.

Table 1 shows the classifications of partner types used in the English versions of each questionnaire. Table 2 is an attempt to find some common categories. It is only a suggestion, based on the English and some of the groupings might not be appropriate. Five broad groups are distinguished:

Group	Description
Cohabiting	Partners who live together whether legally married or not
Established	Partners who do not live together. Relationship can be described as established using locally relevant criteria. These could be relationships of a certain duration or those described using a term which implies social recognition of the partnership. This group includes spouses who live apart.
Casual, new (not yet defined)	Partners who do not live together and whose relationship is not established, though it may have been in existence for some time there is no social function attached. This also covers new partnerships which may yet evolved into an established or cohabiting partnership
Sporadic (locally relevant term)	Those partners where sex is expected to occur only a few times but which are not intrinsically high-risk encounters. This group is probably unimportant and could often be combined with some of those above.
High risk, no "relationship"	Those partners where sex is is expected to occur only a few times and where the partner is from a known high-risk group.

In addition, for some purposes it may be more useful to distinguish spouses from other cohabiting couples and to group unmarried cohabitees with established relationships.

Table 1: Classifications of partners used in recent questionnaires from ALPHA sites

	Kisesa	Masaka	Karonga	ACDIS	Manicaland	Rakai
Partner type						
Spouse or cohabiting	●					
Spouse		●	●	●		●
Cohabiting			●			
Regular	●	●		●		
Girlfriend/boyfriend			●			●
Friend			●			●
Casual	●	●		●		
Other		●		●		●
Other friend or visitor	●					●[1]
Ex-spouse		●				●
Ex-wife or regular partner				●		
Commercial		●				
Bar girl	●		●			
Truck driver	●					●
Stranger			●			●
Relative			●			
In-law			●			●
						●
Supporting information						●
Duration of relationship	●	●		●	●	●
Where partner lives	●			●		●
Whether partner cohabits	●			●		●
Beer hall attendance					●	●

Table 2: Suggested common classifications of partner types.

		Partner type	Kisesa	Masaka	Karonga	ACDIS	Manicaland	Rakai[1]
Cohabiting		Cohabiting- non spouse	●		●	●		
Cohabiting	Spouse	Spouse- cohabiting		●	●	●		●
Established	Spouse	Spouse- non-cohabiting	●		●	●		●
Established		Regular	●	●		●	●*	
Established		Girlfriend/boyfriend			●			●
Established		Consensual partner						●
Casual, new (not yet defined)		Friend			●			●
Casual, new (not yet defined)		Casual	●	●		●	●**	
Casual, new (not yet defined)		Other friend or visitor	●					●
Casual, new (not yet defined)		Workmate						●
Casual, new (not yet defined)		Boss/work supervisor						●
Casual, new (not yet defined)		Employee						●
Casual, new (not yet defined)		Fellow student						●
Sporadic (locally relevant term)		Relative			●			●
Sporadic (locally relevant term)		In law			●			
Sporadic (locally relevant term)		Ex-spouse or regular ptnr		●		●		●
Sporadic (locally relevant term)		Other		●		●		●
High risk, no “relationship”		Commercial		●				
High risk, no “relationship”		Bar girl			●			
High risk, no “relationship”		Stranger			●			●
High risk, no “relationship”		Partner from beer hall					●	
High risk, no “relationship”		Rapist						●

High risk, no “relationship”		Sugar daddy						●

* Any reported relationship of >12 months duration. **Any reported relationship of <12 months duration, partner not from a beer hall.

ALPHA network study sites – background information

Cohort study name	Institutional affiliation	Start year	Site location	Sero-survey timing	Demogra-phic sur-veillance	Cohort size in 2008 *	Approx person-yrs obs*	HIV prevalence (trend) in adult population
Kyambuliwa general population cohort	Uganda Virus Research Institute; UK Medical Research Council	1989	25 villages in Masaka district, Uganda	annual since 1989	annual	7,000	115,000	8.5% (1990) 6.5% (2000) 7.7% (2005)
Rakai Health Science Programme	Uganda Virus Research Institute; Makarere University	1994	50 communities in Rakai district, Uganda	annual since 1995	annual	14,000	168,000	17.7% (1995) 12.8% (2003)
TAZAMA project: Kisesa cohort	Tanzania National Institute for Medical Research	1994	6 villages in Magu district, Mwanza region, Tanzania	approximately every 3 years since 1994	approx. half yearly	28,000	350,000	6.0% (1994) 8.3% (2000) 7.3% (2006, provisional)
Karonga Prevention Study	London School of Hygiene and Tropical medicine	1988	25 community clusters near Chilumba, Karonga district, Malawi	retrospect 1988 pilot 2005, baseline 2007	continuous since 2002	32,000	150,000	3.8% (1988) 7.5% (2007, provisional)
Manicaland HIV/STD Prevention Project	Biomedical Research and Training Institute, Harare; Imperial College London	1998	12 communities, stratified by socio-economic setting Manicaland, Zimbabwe	1999, 2002, 2004	same as sero-survey	30,000	90,000	22.9% (1999) 20.0% (2002) 18.0% (2004) (av. all strata)
Umkhanyakude cohort	Africa Centre for Health & Population Studies, SA Medical Research Council	2003	Hlabisa district, KwaZulu Natal, South Africa	2003, 2005 and 2006	half yearly	86,000	430,000	22% (2003)
Kisumu Health and Demographic Surveillance Study	Kenya Medical Research Institute; Centre for Disease Control, USA	2001	384 villages in Siaya and Bondo districts, Nyanza Province, Kenya	started 2008, finishing 2009	3 times a year	204,000	945,000	~15% (2008, AIS estimate in Kenya DHS)
Nairobi Urban Health DSS	African Population and Health Research Center, Nairobi	2002	Korogocho and Viwandani settlements, Nairobi, Kenya	pilot 2007	3 times a year	52,000	330,000	~8% (2008, UNAIDS est, pilot 13 +/- 2%)
Kilombero-Ulanga DSS	Ifakara Health Institute,	1996	25 villages in Morogoro region, Tanzania	pilot planned for 2010, then every 2 years	4 times a year	65,000	not yet	~8% (2007, AIS estimate in Tanzania DHS)

* Demographic surveillance totals include children for whom HIV status is not measured in most studies

Agenda

ALPHA network meeting on measuring sexual behaviour

Monday Dec 7th : Measurement methods – general rapporteur: Sam Clark

The emphasis will be on exploring and evaluating survey instruments and data collection protocols used in the ALPHA network cohort studies and elsewhere. Since many of the experiments with partnership questionnaires have been very recent, we do not expect analytical results to be presented, but rather reports on the experience of developing questionnaires, training enumerators and piloting surveys. All the presentations on this day will be very short (10 mins plus 5 mins for clarification questions) and at the end of each session there will be some time for a more general discussion.

time	Session topics and presentation titles	Session chairs & presenters
9.30 – 10.30	**Registration, coffee**	**in charge: Hussein Babah**
10.30 – 11.00	**Welcome and opening remarks**	John Changalucha: NIMR Peter Ghys: UNAIDS Basia Zaba: ALPHA network
11.00 – 12.30	**1. Questionnaire design – paper-based methods for face to face interviews**	**Chair: Jim Todd** **rapporteur: Ivan Kassamba**
11.00	Use of partner loop in Manicaland data collection	Simon Gregson, Manicaland
11.15	Masaka use of calendars in partner loops	Dermot Maher, Masaka
11.30	The Kisumu relationship history calendar	Caroline Kabiru, APHRC
11.45	Measuring frequency of intercourse	Emma Slaymaker, LSHTM
12.00	Which aspects of sexual behaviour data collection need to be harmonised in ALPHA studies?	**general discussion**
12.30 – 13.30	**Lunch**	
13.30 – 15.00	**2. Other data collection methods**	**Chair: Alison Wringe** **rapporteur: Ndoliwe Kayuni**
13.30	Group interviews and voting boxes	Simon Gregson, Manicaland
13.45	Use of PDAs	Erick Mgina & Clemens Masesa, MKV
14.00	Audio computer assisted self-interview	Fredrick Otieno, Kisumu
14.15	Use of household roster data	Basia Zaba, Kisesa
14.30	Role of qualitative methods	Joyce Wamoyi, Kisesa
14.45	Should ALPHA sites conduct parallel enquiries using other data collection approaches?	**general discussion**
15.00 – 15.30	**Tea**	

Monday Dec 7th continued

time	Session topics and presentation titles	Session chairs & presenters
15.30 – 17.00	**3. Hard to recruit populations, taboo topics and data validation**	**Chair: Basia Zaba** **rapp: Xavier Gomez-Olive**
15.30	Experiments with RDS in HIV cohort studies	Richard White, LSHTM
15.45	Collecting data on MSM and other illegal activities	Dermot Maher, Masaka
16.00	Exploiting mobile phone technology	Marelize Gorgens, World Bank
16.15	Discordant partner studies: recruitment, follow-up, ethics, and multiple partners	Joseph Kagaayi and Adrian Musiige, Rakai
16.30	ALPHA role in (1) validating questions by examining consistency of responses, (2) validating results by comparing data collected using different methods	**general discussion**

Tuesday Dec 8th: Analysing partnerships and sexual networks – general rapporteur: Mary Mahy

Analyses under discussion in this session might not be complete – we are interested in hearing about proposed methods that have not yet been tried, and analyses that will require new questions (building on discussions of day 1), as well as critiques of previous studies and an assessment of biases inherent in earlier approaches. The emphasis will be on descriptive analysis, and identifying measures and indices that will allow us to compare HIV risk related to sexual behaviour between the different sites. In these sessions we will allow slightly longer for each presentation: 15 to 20 minutes of slides, with 10-15 minutes for questions and discussion after each presentation.

time	Session topics and presentation titles	Session chairs & presenters
9.00 – 10.30	**4. Concurrent partnerships**	**Chair: Benjamin Clark** **rapp: Eveline Geubbels**
9.00	Introduction – general aims of the analysis sessions	Basia Zaba, ALPHA
9.30	Estimating prevalence of concurrent partnerships using DHS-type questionnaires	Emma Slaymaker, LSHTM
10.00	Bias and selectivity problems in analysing data on cohabiting partners	Stan Becker, JHSPH *(speaking on Skype)*
10.30 – 11.00	**Coffee**	**Chair: Connie Nyamukapa** **rapp: George Mgomella**
11.00 – 12.30	**5. Analysis of partnership turnover**	
11.00	Age-specific partner acquisition rates (ASPAR)	Emma Slaymaker and Milly Marston, LSHTM
11.30	Lifetime partners and cumulated ASPAR	Jeff Eaton, IC
12.00	Asortative mixing in cohabiting partners	Jim Todd, Kisesa
12.30 – 13.30	**Lunch**	

Tuesday Dec 8th continued

time	Session topics and presentation titles	Session chairs & presenters
13.30 – 15.00	**6. Sexual networks**	**Chair: Simon Gregson** **rapp: Monica Chizororo**
13.30	Local network methods for detecting biases in reports of non-cohabiting partners	Basia Zaba, Kisesa
14.00	Current partnership networks and respondent driven sampling (RDS)	Sam Clark, Univ. Of Washington
14.30	Co-parenting networks (PAPER WITHDRAWN)	Mia Crampin, Karonga (presented by Basia Zaba)
15.00 – 15.30	**Tea**	
15.30 – 17.00	**7. Ecological and individual level analyses**	**Chair: Sam Clark** **rapporteur: Adrian Musiige**
15.30	Polygyny, concurrency and HIV risk	Georges Reniers, Princeton
16.00	Community level incidence outcomes related to summary behaviour indicators (PAPER WITHDRAWN)	Geoff Garnet, Imperial College (presented by Jeff Eaton)
16.30	Focus of ALPHA joint analyses of sexual behaviour: beyond concurrency?	**general discussion**

Wednesday Dec 9th: Using facility data, policy relevance, next steps – general rapporteur: Jim Todd

The main aim of the final day will be to plan ahead for joint studies by members of the Alpha network over the next four or five years, and to think about how our results can be used in a wider context – e.g. national estimates and projections; informing programmes delivering treatment and care.

time	Session topics and presentation titles	Session chairs & presenters
8.30 – 10.00	**8. Sexual behaviour in the context of ART**	**Chair: Dermot Maher** **rapporteur: Denna Michael**
8.30	Sexual behaviour in the era of ART: new information needs	Mary Mahy, UNAIDS
8.45	Sexual behaviour of infected persons by knowledge of HIV status	Simon Gregson, Manicaland
9.15	Ethical and practical problems of linking survey and facility data	Alison Wringe & Ben Clark, Kisesa
9.45	Partner notification in STI treatment facilities	Tony Ao, MITU
10.00 – 10.30	**Coffee**	
10.30 – 12.00	**9. Data and analysis requirements of national and international organisations**	**Chair: Mark Urassa** **rapporteur: Doris Mbata**
10.30	Tanzania national policy-makers' perspective	Mary Kibona, CDC Tanzania
11.00	UNAIDS requirements	Peter Ghys, UNAIDS
11.30	Way forward	**General discussion**

12.00 – 13.00	**Lunch and non-ALPHA participant departures**	
time	**Session topics and presentation titles**	**Session chairs & presenters**
13.00 – 15.00	**10. ALPHA working group meetings**	**Chair: Basia Zaba**
13.00	Developing data specifications for pooling data between ALPHA network sites	Milly Marston
13.30	Joint questionnaire development and site-specific data analysis plans	parallel break-out session ***rapporteur: tbc***
13.30	Prospects for pooling behaviour data, development of meta-analysis and comparative analysis plans	parallel break-out session ***rapporteur: tbc***
15.00 – 15.30	**Tea**	
15.30 – 17.00	**10. (contined) ALPHA working group meeting**	**Chair: Joseph Kagaayi rapporteur: Dermot Maher**
15.30	Next steps – report from break-out groups and plans for future work	**General discussion**

Meeting outputs

Planned outputs for this meeting would be:

1. A copy of all the presentations and a report on the discussions to be made available to UNAIDS and posted on the ALPHA network web site
2. An update of the sexual behaviour questionnaires currently in use by Alpha member sites posted on the web site
3. Draft protocols for joint studies of sexual behaviour and HIV infection risk, including methods for identification of risk due to behaviour of cohabiting partner, characteristics of non-cohabiting partners and partner ART use.
4. Formation of a working group to design questionnaire modules for use in joint surveys and meta-analyses and agree their use with site PIs, after discussing issues of backward compatibility
5. Proposals for ALPHA network sites to do validation studies for new questions planned for DHS surveys

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